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Abstract of the Disclosure

An optical apparatus and method are provided for controlling the polarization of light. An incoming beam is directed at a photonic crystal. The photonic crystal is designed to act as a transmission quarter-waveplate or half-waveplate; as a reflection waveplate; or as a polarizer. In addition, the photonic crystal may be designed to accomplish phase matching in nonlinear optical mixing processes, as well as obtaining other selected effects upon incoming beams having known polarizations.